corresponds very closely with the results of excitation of the fibres in the living animal of the same species (Beevor and Horsley). In all the cases in which there was coarse degeneration in the internal capsule it was, with two exceptions (both hallux cases) grouped on the outer edge of the capsule. Attention is called to the fact that a large proportion of the coarser fibres passing down through the capsule enter the substantia nigra, and these experiments show this tract to be nearly or quite as large as that passing down into the pyramid. These are apparently fibres which have been looked upon as pyramidal, and, as the "pyramidal tract" has been shown to be even more extensive in the medulla and below the decussation than in the internal capsule, it follows that the fibres passing to the substantia nigra are probably replaced by others arising at lower levels. These degenerations show that in the monkey the facial fibres are situated in the middle third of the crus, in which they are mingled with the fibres of the pyramid, and that they do not occupy a space by themselves mesial to the pyramid.

VI. "On the Cause of the Differences in Lichtenberg's Dust-Figures: Preliminary Note." By Silvanus P. Thompson, D.Sc., F.R.S. Received May 9, 1895.

As ordinarily produced by dusting a mixture of red-lead and lycopodium upon a surface which has been charged by contact with the knob of a Leyden jar, the dust-figures present a remarkable and hitherto unexplained difference of form. The positive figures consist of white lines branching in stellate or dendritic patterns, whilst the negative figures exhibit red patches of circular or ovate outline. The differences, save in the matter of colour, are not due to the powders used nor to the nature of the dielectric surface chosen for the experiment. They vary only slightly with the nature of the gas; but are more considerably altered by the rarefaction of the air. The author found that the dendritic patterns of the positive figures are correlated to the brush form of discharge, whilst the rounded patches of the negative figures are due to the silent discharge of electrified winds. When polished metal surfaces are used in air for producing the discharges (as in the usual case when the knob of a Leyden jar is employed), negative electrification more readily discharges itself in a wind, positive electrification less readily, disruptively, as a brush. But where a smooth surface of a peroxide, such as the peroxide of lead, is substituted for a metal knob, positive electrification will discharge itself as a wind, giving rise to white positive figures of rounded outline; while negative electrification will under certain conditions produce a brush discharge from the peroxide surface,

giving rise to red dendritic patterns. The author considers these differences to be analogous to the differences observed in the experiments of Oliver Lodge upon the photo-electric loss of charge first observed by Hertz.

VII. "Theorems on the Attraction of Ellipsoids for certain Laws of Force other than the Inverse Square." By E. J. Routh, F.R.S. Received May 11, 1895.

(Abstract.)

The object of the author is to find finite expressions for the potentials of an ellipsoidal shell, and of a solid ellipsoid when the law of force is the inverse κ^{th} power of the distance, κ being positive or negative. It is shown in the beginning of the paper that the two cases in which κ is an even integer and an odd integer require different treatment.

After discussing some special cases, we come to the first general theorem. Supposing that κ is even and that the shell is a thin homogeneous homœoid, the potential is found to assume very different forms according as κ is greater or less than 3, so that the law of the inverse square is just on one side of the boundary. When $\kappa > 3$, the potential can be completely integrated, and an expression is found containing $\frac{1}{2}(\kappa-2)$ terms, and involving only the differentiation of an integral rational function of xyz of $\kappa-4$ dimensions. The general form at an internal point is

$$V = \frac{2\pi\mu}{(\kappa-1)(\kappa-3)}\left(\frac{2}{E}\right)^{\kappa-3}\left\{1+\frac{1}{2^2}\frac{E\Delta}{\kappa-4}+\frac{1}{2^4}\frac{E^2\Delta^2}{1.2(\kappa-4)(\kappa-5)}+\ldots\right\}P,$$

where
$$P = (\alpha^2x^2+\beta^2y^2+\gamma^2z^2)^{\frac{1}{2}(\kappa-4)}$$

$$E = 1-\alpha x^2-\beta y^2-\gamma z^2$$

$$\Delta = \frac{1}{\alpha}\frac{d^2}{dx^2}+\frac{1}{\beta}\frac{d^2}{dy^2}+\frac{1}{\gamma}\frac{d^2}{dz^2}.$$

When κ is < 3 the potential takes the form of a single integral

$$V = \frac{2\pi\mu}{\kappa-1}\int_0^\infty u^{-\frac{3}{2}}du\left(u^2\frac{d}{du}\right)^t\frac{abcu^{\frac{3}{2}}}{Q\lfloor t}\left(1-\frac{x^2}{a^2+u}-\frac{y^2}{b^2+u}-\frac{z^2}{c^2+u}\right)^t,$$

where $t = \frac{1}{2}(2-\kappa)$. This reduces to the ordinary well-known form when $t = 0$, *i.e.*, when the law is the inverse square.

Proceeding next to a thin heterogeneous homœoid, the density being $\phi(\xi\eta z)$ where ϕ is a function of i dimensions, different cases